

DEVOTED TO AGRICULTURE HORTICULTURE HORSES CATTLE SHEEP SWINE ETC.

Volume LIII., No. 1.

plate before I found it out. It was all I could possibly do, however. I never could

plate before I found it out. It was all I could possibly do, however. I never could abide oysters, never. Perhaps I ought not to say this, for so many are fond of them. But it was late in life before I even tasted an oyster.

There was a table was "salutious," as Yankees are accused of saying. It was the farm, save the dressings and such things as are not raised in southern fowls. Says I to myself, "The man who lives by manual labor on a farm in any other land never dreamed even of such a table. The Lord pity them!"

I was handed last week a paper published at Bristol in England. One page was devoted to markets, just as our own papers practice. I turned first of course to that page. I am always looking up something that may interest my readers. There was the home market, sure enough. The column was like this:

Eggs one shilling and tencepence, 1 c., 42 cents.

Butter two shillings—30 cents. How's that for high? I take it that the man who works by the day there eats but very few eggs, and no butter. Gracious goodness! I wouldn't, if I were an English citizen, stay there a minute longer than this. I may as well stay a second! I would take my man and all the children and I had and go, or come to this happy land of freedom, where I have seen lucky tramps throw away hand-outs of as good victuals as ever were cooked. The matron has gone outside the front gate and gathered it up and buried it lest the vile tramp had poisoned it and the dog and poultry be poisoned. Such fellows should be shipped across the briny deep.

EDWARD B. HEATON.  
OUR LETTER BOX.

Subscribers will please ask their questions as briefly as possible, and on a separate piece of paper. Give full name and address. Answers may be looked for in the department to which they belong, in subsequent issues, if not given with the question.

**WHITE CHINA GEESE.**—A subscriber would like someone to describe the White China geese, giving size and quality of flesh and feathers. Who can do it?

**FISH POND.**—I would like some information regarding the construction of a fish pond and the best kind of fish to put in it.  
W. E. HUTCHINSON.

Dallas O., Mo.

CASHMERE AND COMMON GOATS WANTED.—C. L. Cummings, Kingfisher Co., Okla. Ter., wants the addresses of breeders of cashmere and common goats.

We have published recently a number of requests like the foregoing, which would make it appear that goat breeders would do well to advertise their stock.

**THE END GRAINS ON THE COB.**—The RURAL WORLD is asked, Is there anything in planting the grains from the small end of the cob as a means of keep-

ing up the breed of the corn? No, careful tests have shown that there is no material difference in any respect as to germinating powers of grains taken from various portions of the cob. Kernels taken from

**KAW VALLEY, KAN.**—During the fall we had the finest weather for shucking corn, and other work on the farm, that

I have known since '71. Corn is good, but not as good as most farmers expected, the yield being about 30 bushels per acre on old bottom land, but where the clover sod was plowed under the yield was 40

bushels per acre. There was not much wheat sown in this locality. Hogs are scarce, owing to the cholera last summer. Corn is worth 24 cents per bushel.

Dec. 22. JAMES MASKIL.

**A DAIRY SCHOOL.**—W. E. Crawler, of Vernon Co., Mo., asks the **RURAL WORLD** if there is a dairy school in Missouri.

The State Agricultural College at Columbia, Mo., gives instruction in dairying, not to the extent, we are sorry to say, that is done in other states, where advantages for dairying are far inferior to those

of this state. There is a "short course" in dairying provided as one of a series just now beginning, and which will continue during the coming three months. Prof. H. J. Waters, Dean, Columbia, Mo., will

BOONE CO., CENTRAL MO.—It is with much pleasure that I receive the RURAL

WORLD each week. I must tell of my home, situated upon a hill overlooking the great Missouri River and the famous M., K. & T. Railroad. It is also in plain view of the capital of Missouri. I am interested in growing fruit, also raising fan-

cy poultry and Shropshire sheep. I have quite an aply as a side issue. I planted about 500 fine young fruit trees, purchased of the old, reliable Stark nursery of Louisiana, Mo. There is also an acre of strawberries, the plants having been obtained from Judge Miller and his

obtained from Judge Miller, and now can I expect failure! I have the finest strains of the following breeds of poultry: Barred P. Rocks of the Conger and Felch strains; Light Brahma, Felch strain; Silver Wyandottes, Brown Leghorns, Pekin ducks and Mammoth Bronze turkeys.

of the Emma Y. Foster strain. My fowls were all attacked with roup, some 25 or 30 cases at once. For the benefit of others I will give my remedy. Take copperas and make a strong solution, to one quart add one teaspoonful of crude carbolic acid.

Dip the chicken's head into this preparation until it strangles. Do this two or three times a day until cured. Put sulphur in the mouths of the chickens. By the use of this remedy I lost only one chicken.

J. BAKER SAPP.

Boone Co., Mo.







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## Horticulture.

### HORTICULTURAL TALKS.

Late Planting—Dec. 23, I planted 24 worth of Paragon chestnuts, that had been packed in sand for spring planting. If the weather continues so fine, I may plant out some peach trees yet. I shipped, to a friend in Kansas, 2,000 grafts of apple, pear, cherry and plum—about 60 varieties in all; so the readers can see that I am not idle. Some ask me why my process at the horticultural meetings is so often missed. For the information of all such I will state that here at home I can regulate matters to suit my bodily comfort, which is next to impossible abroad. I am too old to take trips of 300 miles in the winter, even when I am quite well, which was not the case the day that I should have found me on the way to Princeton.

A New Nut.—From Frank Slater, Rich Hill, Mo., came a box of nuts of which he wished my opinion. They are from a tree which stands alone in the bottom. The tree has a bark resembling a pecan tree, but is much rougher, yet not resembling the shell-bark hickory. The tree is about two feet in diameter. Mr. Slater thinks it a hybrid; so do I. The nut is 1 1/2 inches long, 1/2 inch broad, and 1/2 inch thick. It resembles a pecan more than a hickory, but externally, the inside the meat is divided more like a hickory nut; thin, hard shell, full of excellent meat. I wish I had a tree like it on my grounds. It bears well. A few of the nuts will be planted, although it is not likely that I will ever see the trees bear, even if the nuts grow. The Nussbaumer, that was described in the RURAL WORLD some ten years ago, is now a tree 15 feet high and six inches in diameter, but has never borne any nuts. That the pecan and hickory will cross is not at all surprising, and no doubt many of these crosses have been found.

The Casabannas.—This fruit has been mentioned several times the past summer. Now, we can tell more about it. The fruit ripened in the house. It is a foot long, four inches through and of a dark scarlet color. It makes a nice preserve somewhere between a citron and pineapple. To mature it in this latitude the seed must be started in the house early. By the time the ground gets warm the plants should be six inches high. It is a very strong grower and should have a dead tree to climb on. The foliage is handsome; the vine bears a nice little yellow blossom. I paid an extravagant price for a few seeds, but will send a small packet of seed to any of the subscribers of the RURAL WORLD who send a stamped and addressed envelope for the same. The packages will contain only about ten seeds, however. If any choose to add a stamp to pay for the putting up I'll not kick about it. I mention a dead tree, because the vine I had on a dead tree matured its fruit, while the one on a Keiffer pear did not. The Keiffer showed no fruit or the vine would not have been allowed to run on it. That there is any great value in this thing is not for me to say, but that it is an interesting novelty anyone will admit. Its native place is Madagascar Island. I have been told. All who wish seeds must apply before Feb. 1, 1900, as after that time I will not have time to attend to them. Bluffton, Mo. SAMUEL MILLER.

### A MACEDONIAN CRY.

Calling for More Practical Means of Disseminating Knowledge of Plants.

Editor RURAL WORLD: The rich man in torment applying for a messenger to be sent to his kinsman was told "They have Moses and the prophets," etc. Arguing the necessity of an inductive medium of disseminating elementary botanical, horticultural and forestry knowledge among the rising generation of our land—a subject so frequently discussed on progressive educational grounds—one is curiously led to wonder how it is that the people go there for what information they want. What business have people who cannot read, in a library, however popular and instructive? What real benefit will the young and the old derive from an occasional visit to a botanical garden, when they are devoid of any knowledge whatever of botany and floriculture? The components of a garden useful to the practical instruction of the pupils of a town or city must be selected and associated from a different point of view from that in vogue in the maintenance of a botanical garden.

The question of the introduction of instructive plants and civilizing grace of outline into the barren school and college grounds must everywhere, has been kindly chosen by the director of the Missouri Botanical Garden as a fit subject of discussion at the annual reunion of horticulturists and learned professors around the festive board spread by the liberality of the late Henry Shaw. This subject has been discussed and toasted at the last two banquets. The need now is practical verification of all the good wishes so liberally expressed. Will some one go to work and start the ball in some wide-awake community outside of the city?

At the late meeting the Botanical Garden, the Horticultural Department of the Agricultural College and the time-honored State Horticultural Society came in for a special share of hope and praise. Gov. Cameron kindly added to the constellation a fourth star, the Experiment Station, so liberally endowed by the government. It is surely time that these centers of knowledge should do something to aid in the popular education and instruction of plant life.

Now, let the RURAL WORLD raise the Macedonian cry, calling on the leaders of the State Society to come out from behind the barricade of apple barrels, peach baskets and berry cases and devise a rational and practical plan, applicable under all conditions, by which school grounds can be brought in harmony with the civilized ideas of our day, stocked and embellished by collections of plants from which the most practical system of instruction can be devised and imparted to the rising generation. The modest country school and the stately, costly hall of science looming up in all directions can thus be directly benefited and a new educational medium be installed amidst our wonderful fabric of popular instruction, unsurpassed by any nation of the earth. Let our State Horticultural Society prepare a practical guide and send it broadcast throughout the state, mailing the first copies thereof to the regents of our Normal Schools, presenting the subject in all its bearings on the advancement of useful knowledge, true refinement and artistic culture of the masses of the people.

Our good friend who makes the foregoing fervent appeal for a cause which we know lies close to his heart will be pleased to know of the interest that is growing in the public mind in regard to instruction in plant growth. Prof. W. J. Stevens, superintendent of the Carthage, Mo., public schools, who was one of the speakers at the late Henry Shaw banquet, referred to by "Ex-Attache," says in a late school report:

"The public are coming to know that schools should have an intimate relation to the home. The influence of the school should be felt in the home in a specific way. There is every reason why its influence should be seen in the appearance of the grounds about the home. This will be done when geography study is made to include the observation of plants. Instruction that will give a knowledge of the principles of plant growth, plans for beautifying homes by utilizing every small space of ground so as to make them beautiful as well as contributors to the support of the family, is of more value than learning where Timbuctoo is. Our schools must train boys for something besides law, medicine, or teaching. The world needs men who shall invent and discover in the realm of the mechanical arts and chemistry those things which administer to the wants of their fellow men. It needs men who can with the least expense of energy make two blades of grass grow where only one grew before."

## Leaf-Crumpler.

Editor RURAL WORLD: I herewith inclose samples of some insect work which I cut from trees in my young apple orchard. There is a good deal of work of this same character on the limbs of the trees and in the forks of the little twigs. Will you please explain what it is and give a remedy providing damage to the orchard will result for such insect work? I, also, send leaves from the same orchard. Most of the trees have quite a good many leaves still clinging to the twigs. The trees were quite green and thrifty until the cool weather set in. It seems to me that apple trees should shed their leaves sooner. The orchard is two years old and cultivated in corn. The trees were holed in July. The trees have made a splendid growth and look very thrifty.

A. T. MAXEY.  
Jefferson Co., Ill.

Answered by Prof. H. C. Irish: The inclosed specimens were larvae cases (together with the inclosed larvae) of an insect commonly known as leaf-crumpler (Phyllis indigenella). The young larvae appears late in summer, making about one-half of its growth before winter. During this time the case is constructed and surrounded with a mass of dried and crumpled leaves in which the larva remains in a torpid state until plant growth begins in spring. With the unfolding of the leaves the worm resumes its activity and begins eating the young leaves. It completes its growth in June, changes to a chrysalis, and about two weeks afterwards becomes a moth which deposits its eggs in July and later the larvae hatch, which completes the life cycle. This insect is known to work upon the apple, cherry, plum and peach, but has rarely occurred in very large numbers. When abundant, however, it rapidly denudes the trees of their leaves. At least two species of parasites feed upon the larvae and the latter is doubtless thus kept in check to a great extent. The only way of destroying the larvae is to gather the cases during the winter and burn them.

Concerning the leaves on the trees at this season of the year it is probable that active growth continued too long. Late cultivation will produce late growth or prevent proper ripening of wood, but as that was not given in this case there must have been some other cause. Abundant rain during autumn will produce the same effect especially if there was a dry summer.

H. C. IRISH,  
Missouri Botanical Garden.

### THE WILDER GRAPE.

Editor RURAL WORLD: In the RURAL WORLD of Dec. 14 an engraving of the Wilder grape was shown, which, to the average reader, would perhaps condemn that most valuable variety, and I feel it my duty to say a word in its favor. I consider the Wilder the most satisfactory black grape in cultivation, all varieties having been pretty thoroughly tested. Comparing it with the Concord, it is earlier, better in quality, larger both in bunch and berry, just as hardy and ever so much better as a shipper. While it ripens just after Moore's Early, I have kept it in perfect condition in an ordinary cellar until January. This variety being exceptionally vigorous in growth, the mistake of pruning too long and expecting a vine to mature too many of its immense bunches is commonly made, and when thus improperly grown the weakness of foliage shown in said engraving will naturally result, and it is also for this reason that it is by many considered not hardy. The Wilder proved perfectly hardy here last winter, and I dare say that if I had been in the habit of pruning it the same as Concord, much loss would have been the result.

To obtain best results it is necessary to study each individual variety and treat it according to its needs. This should be practiced more or less with all fruits, but especially with the grape. Another thing that should be considered is that a variety can not be fairly tested by a single vine, plant or tree, as the case may be.

With grapes I consider that a half dozen vines are necessary to secure a fair test. For example, suppose that the Concord was a new variety, and we were to judge it by numerous specimen vines to be found in many a Concord vineyard; we would probably form a poor opinion of it. It is, therefore, not reasonable to suppose that in getting a vine of a particular variety we may get one of these weaklings? Or the vines might be good and be planted in a particular spot where it would not show itself to the best advantage. In setting the new varieties, as I am in the habit of doing, it is no uncommon occurrence to get vines that are small and weak, much inferior to those of my own propagation.

EDWIN H. RIEHL,  
Alton, Ill.

MR. A. TUTTLE reports to the Boonville, Mo., "Democrat" that his prospects for a large crop of berries and apples for next year are excellent now. He has over 2,000 young apple trees in fine bearing condition.

COL. C. C. BELL, of Boonville, who is known throughout the state as the "apple king," has ceased shipping apples for the season of 1899. He did a comparatively large business, considering that the season was so early, and that the crop was so small. The quality of the fruit was inferior and towards the last prices dropped materially.

Colonel Bell says that the outlook for the apple crop of 1900 is decidedly promising. Owing to the fine weather late in the fall the trees are more rugged and will be able to stand even the severest winter. The apple yield next year will likely be a record breaker—Boonville (Mo.) Advertiser.

BATES CO., MO., FRUIT NOTES.—The close of the year is near. It has been a very prosperous one with me. I am what is termed a small fruit farmer. I like the business and nothing pays better if a person is rightly located. The blackberries and raspberries have gone into winter quarters in fine shape. Nothing but very cold weather will beat the out of a crop. The dry weather thinned out the strawberry beds somewhat, though the late rains made plants enough in most cases, and they, too, went into winter quarters all right.

J. J. CAMERON.  
HIGHER PRICES FOR FRUIT.—The marketable condition of all kinds of fruit is much improved and the price substantially increased by the use of attractive boxes and baskets. The Pierce-Williams Co., of South Haven, Mich., manufacture packages that not only improve the appearance of fruit, but preserve its quality. It will pay any fruit shipper to send for their new free catalogue—an interesting guide to fruit packing.

WHAT IS SPLETTZ?—Splettz, also called all about this wonder, also called Million Dollar Potato. If you farm you need it. Largest Vegetable Seed Growers in America. Send this notice and 10c in stamps for 10 Rare Farm Samples and Catalogue to John A. Splettz Seed Co., La Crosse, Wis. [P]

## Leaf-Crumpler.

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H. C. IRISH,  
Missouri Botanical Garden.

### INFORMATION WANTED

Regarding What to Plant and How to Plant.

Editor RURAL WORLD: I want to plant a small orchard in the spring and would like to have a list of varieties suitable for this section; also strawberries, raspberries, currants and gooseberries, peaches, pears and plums, and if possible prices of the same. I want part of the apples to be early bearers and planted between the others and the early ones out when the others need more room. For want of space I will have to plant as closely as possible. The soil is very good and the land mostly level. It has been cultivated in corn the last two or three years. Will it do to plant peaches between the apple tree rows when the latter are about 25 or 30 feet apart? I have read that the peaches did very well but that the apple trees were much injured. I would be glad to have positive information regarding this.

What kind of peaches, beside the Elberta would you recommend for good, extra early; and what for medium and late for a small family orchard? Do you know anything of Stark's Summer Snow or Black Ben Davis? Would you recommend Wolf River, Jeffries Stayman's Winesap or Gano in preference to old sorts, or to Ben Davis? Would you advise planting the Koonce and Krull varieties of peaches? Is it your opinion that whole root trees are worth more than piece root trees? I got a lot of them from Stark Bros. the fall of '98. The Apple of Commerce, Wolf River and Jeffries winter killed badly. The Black Ben Davis, Duchess and Yellow Triumph did much better. I also lost a good many peaches, pears and plums but last winter was unusually cold (25 degrees below zero) for this section. Am thinking of planting Missouri Pippin, Duchess of Oldenburgh, Yellow Transparent and Wealthy between rows of others for early bearers. Can you recommend anything better?

L. A. DASHMUTT,  
Alexander Co., Ill.

Edwin H. Riehl answered the foregoing questions as follows: For the benefit of L. A. Dashmutter and other interested readers I submit the following varieties of strawberries giving the best general results. Ruby, Hyde and Splendor; raspberries (red, white and black), black caps, Tyler, Kansas and Eureka; currants, North Star, Wilder and Fay. For a succession of the best peaches, plant Sneed, Alton, Elberta, Washington, Stevens' Rare-ripe, Wilkins' Cling, Smock and Salway. Among the best plums are Wild Goose, Abundance and Burbank. Be not yet puffed by the Gold.

One should take quite a hobby to decide which of the peaches is best to plant. Ragan (White Ben Davis), Jeffries, Stayman's Winesap, Ben Davis, Gano and Missouri Pippin are valuable apples which I would plant with confidence. Wolf River is a northern apple and would probably not do well in Southern Illinois. Wealthy is an excellent fall variety, and does well over a wide territory. Richardson (Apple of Commerce) I would not plant.

I prefer whole root to piece root every time for this section. As things stand, or any other trees between the apples, and the latter should not be closer than 25 feet.

Anyone planting an apple orchard now-a-days who does not realize the importance of good cultivation, proper pruning and thorough spraying will be sadly disappointed if much more than older apples are expected.

EDWIN H. RIEHL,  
Alton, Ill.

We find upon our table to-day a new catalog of fruits, plants and vines, also of ornamental trees, plants and vines, issued by Green's Nursery Company, Rochester, N. Y. This catalog is a beautiful lithograph cover, embracing many of the rare fruits introduced by this firm. The fruit department contains nearly 12 illustrations. The ornamental catalog attached to the other contains 34 photographs, mostly taken by C. A. Green, of ornamental trees, plants and vines growing upon his own place. Mr. Green makes a special push this season of apple trees, standard and dwarf pear trees, Red Cross Currant, Loudon red raspberry, and Champion peach are leading specialties in this beautiful catalog, sent free to all on application.

## The Apiary.

### ILLINOIS BEE-KEEPERS.

Springfield, Ill., December 27.—The Illinois State Bee-Keepers' Association closed its annual convention to-day, electing the following officers for the ensuing year: President, J. C. Smith, Lincoln; first vice-president, S. M. Black; second, third, fourth and fifth vice-presidents, George F. Pugh, Keokuk; W. H. Hyde, New Canton; Miss Bird O'Connell, Berlin; Miss L. C. Kennedy, Pittsfield; secretary, J. A. Stone, Bradford; treasurer, Charles Becker, Pleasant Plains. The time of the session was devoted to informal discussions of pertinent topics.

A. T. MAXEY.  
Jefferson Co., Ill.

Answered by Prof. H. C. Irish: The inclosed specimens were larvae cases (together with the inclosed larvae) of an insect commonly known as leaf-crumpler (Phyllis indigenella). The young larvae appears late in summer, making about one-half of its growth before winter. During this time the case is constructed and surrounded with a mass of dried and crumpled leaves in which the larva remains in a torpid state until plant growth begins in spring. With the unfolding of the leaves the worm resumes its activity and begins eating the young leaves. It completes its growth in June, changes to a chrysalis, and about two weeks afterwards becomes a moth which deposits its eggs in July and later the larvae hatch, which completes the life cycle. This insect is known to work upon the apple, cherry, plum and peach, but has rarely occurred in very large numbers. When abundant, however, it rapidly denudes the trees of their leaves. At least two species of parasites feed upon the larvae and the latter is doubtless thus kept in check to a great extent. The only way of destroying the larvae is to gather the cases during the winter and burn them.

Concerning the leaves on the trees at this season of the year it is probable that active growth continued too long. Late cultivation will produce late growth or prevent proper ripening of wood, but as that was not given in this case there must have been some other cause. Abundant rain during autumn will produce the same effect especially if there was a dry summer.

H. C. IRISH,  
Missouri Botanical Garden.

### INFORMATION WANTED

Regarding What to Plant and How to Plant.

Editor RURAL WORLD: I want to plant a small orchard in the spring and would like to have a list of varieties suitable for this section; also strawberries, raspberries, currants and gooseberries, peaches, pears and plums, and if possible prices of the same. I want part of the apples to be early bearers and planted between the others and the early ones out when the others need more room. For want of space I will have to plant as closely as possible. The soil is very good and the land mostly level. It has been cultivated in corn the last two or three years. Will it do to plant peaches between the apple tree rows when the latter are about 25 or 30 feet apart? I have read that the peaches did very well but that the apple trees were much injured. I would be glad to have positive information regarding this.

What kind of peaches, beside the Elberta would you recommend for good, extra early; and what for medium and late for a small family orchard? Do you know anything of Stark's Summer Snow or Black Ben Davis? Would you recommend Wolf River, Jeffries Stayman's Winesap or Gano in preference to old sorts, or to Ben Davis? Would you advise planting the Koonce and Krull varieties of peaches? Is it your opinion that whole root trees are worth more than piece root trees? I got a lot of them from Stark Bros. the fall of '98. The Apple of Commerce, Wolf River and Jeffries winter killed badly. The Black Ben Davis, Duchess and Yellow Triumph did much better. I also lost a good many peaches, pears and plums but last winter was unusually cold (25 degrees below zero) for this section. Am thinking of planting Missouri Pippin, Duchess of Oldenburgh, Yellow Transparent and Wealthy between rows of others for early bearers. Can you recommend anything better?

L. A. DASHMUTT,  
Alexander Co., Ill.

Edwin H. Riehl answered the foregoing questions as follows: For the benefit of L. A. Dashmutter and other interested readers I submit the following varieties of strawberries giving the best general results. Ruby, Hyde and Splendor; raspberries (red, white and black), black caps, Tyler, Kansas and Eureka; currants, North Star, Wilder and Fay. For a succession of the best peaches, plant Sneed, Alton, Elberta, Washington, Stevens' Rare-ripe, Wilkins' Cling, Smock and Salway. Among the best plums are Wild Goose, Abundance and Burbank. Be not yet puffed by the Gold.

One should take quite a hobby to decide which of the peaches is best to plant. Ragan (White Ben Davis), Jeffries, Stayman's Winesap, Ben Davis, Gano and Missouri Pippin are valuable apples which I would plant with confidence. Wolf River is a northern apple and would probably not do well in Southern Illinois. Wealthy is an excellent fall variety, and does well over a wide territory. Richardson (Apple of Commerce) I would not plant.

I prefer whole root to piece root every time for this section. As things stand, or any other trees between the apples, and the latter should not be closer than 25 feet.

Anyone planting an apple orchard now-a-days who does not realize the importance of good cultivation, proper pruning and thorough spraying will be sadly disappointed if much more than older apples are expected.

EDWIN H. RIEHL,  
Alton, Ill.

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# Live Stock.

## COMING SALES.

Jan. 4—T. R. Wilson, Morning Sun, Iowa.  
 Jan. 5—R. Miller, Champaign, Ill.  
 Jan. 6—J. S. Risk, Winona, Minn.  
 Jan. 11—J. S. Risk, Winona, Minn.  
 Jan. 12—Charles Gulso, Chestnut, Ill.  
 Jan. 13—Ed Burroughs, El Paso, Ill.  
 Jan. 14—L. G. Jones, Towanda, Ill.  
 Jan. 15—Ed Burroughs, El Paso, Ill.  
 Jan. 16—A. G. Woodbury, Danville, Ill.  
 Jan. 17—Burgess Bros., Bement, Ill.  
 Jan. 18—H. H. Ware, Douglas, Ill.  
 Feb. 22 and 23—H. H. Harris and J. T. Moreland, of Marshall, Mo. Sale at South Omaha. Galloway cattle.  
 Feb. 27, 28 and March 1—T. F. B. Sotham, W. S. Vanatta & Son and C. A. Stannard. Sale at Kansas City, Mo. Herefords.  
 March 6—C. S. Barclay, West Liberty, Iowa. Shorthorns.

## TEXAS FEVER.

The RURAL WORLD has referred a number of times to a bulletin that was in course of preparation at the Missouri Agricultural Experiment Station and which would give the results of the investigations that have been going on at that and the Texas Station for a number of years as to methods of raising northern grown cattle immune to Texas fever.

This bulletin, No. 45 of those issued by the Missouri Station, is now ready for distribution to those who apply to the secretary at Columbia for copies. It is an exceedingly valuable document and of great interest to all breeders of pure bred cattle the world over. Missouri cattle breeders particularly are to be congratulated on the fact that such important work in the interest of cattle husbandry as is embodied in the bulletin is being done at the Missouri Station. The bulletin is by Dr. J. W. Connaway, Veterinarian of the Missouri Experiment Station, and Dr. M. Francis, Veterinarian of the Texas Station. We quote from the bulletin the following:

**GENERAL OUTLINE OF THE WORK.**  
 For many years Texas fever has been a serious obstacle to the growth of trade in blooded breeding cattle, between the Northern breeders and the Southern cattle raisers. The losses from this malady

of the disease, that might be used in a practical way in bringing about immunity in susceptible cattle.

The value of such a material would be that the danger of the development of an acute fever that attaches to other methods, as "tick infestation" and "blood inoculation," would be avoided. Moreover, the material could be transported and used at any distance without the dangers from septicemia that are liable to arise from the shipment to a distance of blood containing the living parasites.

The discovery of the protective properties of the serum of animals made immune to Texas fever.

During the same summer five head more were inoculated at the Missouri Station, two mature cows and three yearling steers. The material used in this experiment came from different sources than that used in the Mississippi experiment—one lot was obtained from the Texas

serum in doses of 40 to 60 cc., according to the size of the animal. The minimum quantity injected into any one animal was 14 cc.; the maximum quantity was 72 cc. After tick infestation, all of them suffered from acute attacks of the fever, and all except two of the younger animals (2 years old) died.

Recent experiments in Australia, where the "fever tick" is gradually spreading over the country on account of the mildness of the climate, show that preventive inoculation by means of infected blood has met with great success as a defensive measure on the cattle ranges of that country. Moreover that the method is being employed in immunizing stud and range bulls intended for infected territory.



Group of Calves at Close of Second Year's Infection.

immune to certain diseases, as diphtheria and tetanus, led to the somewhat broad statement by Behring, one of the chief investigators of serum therapy, "that if an animal has acquired immunity against a disease-producing micro-organism, or its toxins, the serum from the blood of the immunized animal will prevent the disease in another susceptible animal."

While Texas fever is due to a protozoan micro-parasite, instead of bacteria as in the case of diphtheria, the immunity attained on recovery from an attack of the disease appears to be as great as in the

Station, and another from a Texas animal at the North. One cow received subcutaneously a total of 230 cc.; the other one 120 cc., in doses of 20 to 40 cc., over a period of two weeks or more, immediately preceding tick infestation. Both died from acute attacks of the fever, following tick infestation. Not the least mitigation in severity of the attack appears to have resulted from the use of serum.

The three yearling Jersey steers were inoculated with doses of 10 cc. to 40 cc., over a period of two weeks; one steer received 14 cc., another 230 cc., and the third 130 cc. All of these suffered from attacks of the fever after tick infestation, but recovered. A cleft animal, not inoculated, appeared to suffer more severely. This animal, however, was somewhat less vigorous.

In addition to the serum experiments one cow was inoculated with 50 cc. of blood from an animal recently dead from an acute case of Texas fever. A small quantity of formalin was added to destroy the micro-parasites. But little pathological disturbance was noted; indicating that no toxic substance was present. Bile from the same animal was used on another cow with like results. Both cows died from acute cases of the fever after tick-infestation.

While the desired economic end of this experiment was not attained, the data supplied in regard to the effects of tick infestation are valuable in the experiments that follow.

It appears that so far as experiments have yet shown, the only way of producing immunity is through an actual attack of the disease, induced either by "tick infestation," or by "inoculation with living infected blood."

II. Experiments on Immunizing Against Texas Fever by Tick Infestation of Young Cattle.—The fact has long been known to stockmen that calves are more resistant to Texas fever than mature cattle. The same fact has been observed in all scientific investigations of this disease where young and mature cattle were used.

In the investigations of Smith and Kilbourne, into the nature and means of transmitting Texas fever, a large per cent of adult susceptible cattle used in their experiments died when exposed to the infection, while only a small per cent of the young animals succumbed. The case of the dairy herd at Enterprise, Mississippi (mentioned under "serum inoculation"), illustrates in a marked manner the greater resistance of young animals as compared with those more mature. In this lot were eleven head of grown cattle, four yearlings and twelve calves. Out of this number, all the grown cattle except one died; while two of the yearlings and all the calves lived. Those that survived had been grossly infested with ticks and suffered more or less from the fever. In the serum experiments of the following

The work reported herein shows that the employment of this method as a purely commercial measure, has given fair success notwithstanding the unavoidable fatiguing effects of a long railroad journey, and the widely different climatic conditions that must be encountered by cattle shipped from northern to southern sections of this country.

In regard to the mechanical details of this work, it will be sufficient to say that the blood is taken from the jugular vein of a proper supply animal by means of a sterile canula. The vessel for collecting the blood, and all instruments that come in contact with it being sterilized, and kept sterile throughout the operation. The fibrin is removed by means of a wire whipper to keep the blood in a fluid condition. The inoculation is made by means of a properly graduated hypodermic syringe. Minute details as to sterilizing the instruments, drawing and preparing the blood, and making the injections are unnecessary; as those who are competent to carry on this work have been trained in these surgical details. Every one who undertakes inoculation should be familiar with the pathology of this disease, for medical treatment will be necessary in some cases, and cannot be carried out intelligently without a practical knowledge of the pathological processes.

The impression prevails that inoculation against "Texas fever" is as simple and harmless as inoculation against "black-leg." On the contrary, the effects are more severe; some signs of illness are expected in all that become properly immunized and attention is necessary through the inoculation fever. Moreover, some attention must be given throughout the first season of tick infestation to prevent fatal relapses, especially in the older bulls.

(Detailed history follows.)

**SUMMARY AND CONCLUSIONS.**  
 The inoculation fever and immunity.—The reports on the Tod cattle, page 24, and the "College Station" lot, page 43, present the important features of the inoculation fever, such as incubation period, duration and severity of the primary and secondary fevers. Attention is called in the graphic record to the sudden fall of the primary fever; this occurs in many cases, and appears to be the critical period. At this time collapse and death may occur in severe cases.

The variation in the percentage of corpuscles during the fever, in comparison with the variation of temperature, is shown in College Station experiment, see chart, page 65. It will be noted that the diminution in corpuscles corresponds closely to the rise of temperature, but continues for a time after the temperature has fallen; and that during the interval between the primary and secondary fever periods, the percentage rises, but falls again on the occurrence of the secondary fever. The table, page 47, gives the hematocrit readings for each animal, and the average for the group.

It must always be kept in mind that the inoculation fever is genuine Texas fever, and that in some cases it will take an acute course and cause death in the inoculated animal. A few words in regard to the pathology of Texas fever and how immunity against it is acquired and maintained, will aid in the more intelligent handling of inoculated cattle, both during the course of the inoculation fever and during exposure to the infection at the South.

When a susceptible animal is infected with ticks or is inoculated with infected blood, the micro-parasites thus introduced attack the blood-corpuscles and destroy them in large numbers. This is the essential pathological change in this disease. As a result, the oxygen-carrying function of the blood is greatly impaired, and a large amount of debris that requires to be eliminated is added to the blood stream.

The recovery from the fever and the maintenance of an immune condition depends upon the ability of the animal, first, to keep in check the growth of the micro-parasites; second, to supply new corpuscles as rapidly as they are destroyed; and, third, to remove the waste products promptly.

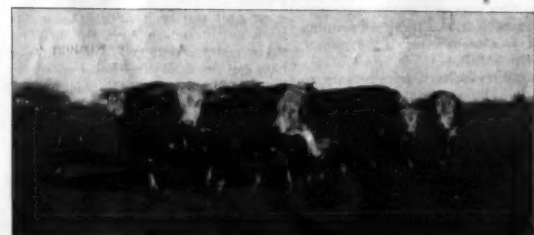
In regard to the micro-parasites, it is found that in this disease ticks feed on others, they probably never entirely disappear from the blood of an animal that has once been infected. In animals, however, that gain a high degree of immunity, the blood contains comparatively few of the micro-parasites. This indicates that by some means their multiplication is inhibited. It is probable that the constant presence of the micro-organisms in the blood has stimulated an increased production of white corpuscles ("phagocytes"), and that by these "soldiers and scavengers" of the blood many of the micro-parasites are destroyed.

As to the regeneration of the red blood corpuscles, this is a function that is carried on normally; for in perfect health the corpuscles are constantly wearing out and must be replaced by new ones. The increased destruction of corpuscles due to the micro-organisms of Texas fever simply stimulates those tissues normally concerned in the production of red corpuscles to greater activity. And it is probable that in all immune Southern cattle and in Northern cattle that become immune, a greater activity of these tissues is maintained throughout life.

In regard to the elaboration and removal of the waste products, resulting from the destruction of the corpuscles—the organs mainly concerned are the spleen, liver, kidneys and bowels. The importance of these organs in removing waste products is readily understood by any one who has seen at the post-mortem of an animal that has succumbed to an acute case of the fever, the enlarged and softened spleen, the intensely yellow liver, clogged with toxin, and the claret colored urines. In immune Southern cattle the spleen is somewhat larger than in Northern cattle, which indicates that a more active condition of this organ and probably of the other organs mentioned is maintained throughout life.

The above facts in regard to the pathology of the disease and the way in which immunity is maintained, shows the importance of keeping an animal well nourished and seeing that the eliminative organs are active.

**Age of animals.**—The most suitable subjects for inoculation are young cattle from 8 to 12 months old, weighing from 500 pounds to 800 pounds. They are more easily cared for than younger or older cattle. Calves recently taken from the cow and not well accustomed to a grain and hay diet do not do well; they fail off in flesh and do not regain condition as rapidly as older, well-weaned calves. These younger calves may, however, be safely inoculated if kept with the cow. In August of the present year (1899), thirteen sucking calves, from three to seven months old, were inoculated on a farm near the Missouri Station, and all except one of the smallest calves did well through the inoculation fever. This lot had not yet been exposed to tick infestation. Our experience with animals above 12 months of age is limited. But the fact that in the natural disease older animals



Group of Inoculated Hereford Bulls, Six Months After Exposure to Infection at the Laurels Ranch, Corpus Christi, Tex.

are more liable to die, leads to the conclusion that aged bulls and cows cannot be immunized as successfully as those of the age mentioned. The two-year-old Waskom bulls gave good reaction from inoculation, and were sent south in excellent condition. Both, however, had a relapse in the South, and were very sick for a few days, but recovered and have done good service.

**Source of Blood for Inoculation.**—Blood from two sources has been used; namely, from naturally immune Southern cattle, and from Northern cattle made immune by artificial tick infestation, and blood inoculation. It is probable that the method by which an animal has been made immune can make no difference in the quality of the blood, since the same end is attained—a permanent infection. Recent observations, however, have shown that the blood of different supply animals may differ in virulence; and that it may vary in the same animal from time to time. In work now in progress on cattle that have not yet been sent south, two supply animals have been used, one a Texas cow that has been north since the summer of 1896, but has been kept on infected grounds the past two summers; the other a northern cow that was inoculated during the past winter and suffered from an acute attack of the fever, but recovered and has carried ticks during the summer and fall without apparent illness. An equal number of cattle have been inoculated from these two supply animals. More severe symptoms have been caused by the blood of the recovered native. This was probably due to the fact that this animal was more grossly infested with ticks during the latter part of the summer and fall than the Texas cow, and was well rested at the time the blood was used. Blood from the same supply animal was used in mid-summer, in doses of 2 to 6 cc. on a few cheap experiment animals without showing as severe symptoms as appeared in others inoculated in the fall with doses of 1 to 3 cc., after the supply animal had become grossly infested with ticks. It is probable that the safest supply animal is one that is thoroughly immune, and in which great variations in virulence of the blood is avoided by keeping free from ticks. The supply animal should be at the place where the inoculations are made and the blood should be used when perfectly fresh.

**Size of Dose.**—The size of the dose will depend largely upon the degree of virulence of the blood used. If the blood of a tick-infested animal is used, doses of from 1 to 2.5 cc. appear to be sufficiently large. Severe attacks of fever have been produced by the use of 1 cc. of blood from an animal grossly infested with ticks. As the susceptibility of animals varies greatly, it is prudent to give a small initial dose and repeat if necessary. In the Bul-

lock and Rhes inoculations, pages 19, 21, large quantities were given, because the blood could not be used for a day or so after being drawn; in these cases an antiseptic was added to prevent decomposition; and no doubt many of the Texas fever germs were destroyed.

**Diet.**—It is important that the inoculated animal should be well nourished, during the inoculation fever and subsequently, since there is a great lowering of the vitality of the animal, due to destruction of the red blood corpuscles. In the experiments at the North, the food has consisted of oats, bran, crushed corn, linseed meal, timothy and clover hay; corn being withheld during the acute stage of the fever. The effort is made to feed in a manner that will maintain a lax condition of the bowels, since the elimination of waste products from the liver is mainly through the bowels. Under the heading of "Inoculation of the South" is given suggestions as to appropriate feeding in that section.

**Season of the Year.**—Inoculations have been made successfully at all seasons of the year. In the north in mid-summer, fall and winter. In the south, in winter and early spring. The most suitable time is at seasons when the animal does not suffer either from extreme heat or cold. If inoculated in the winter the cattle must be well sheltered, as the thinning of the blood resulting from the inoculation fever makes them less resistant to cold. Cattle inoculated in the north should be sent south in December or January, to prevent sudden gross infestation with ticks, as this may bring on a relapse.

**Inoculation in the South.**—Cattle may be safely inoculated in the south, if they are kept free from the fever ticks until well recovered from the inoculation fever, say about 40 days. This is best done in the winter after several severe frosts. In Texas, this would be about January 1, as a rule. A suitable place should be prepared some months previously to receive and hold such cattle. To do this, the best plan seems to be to enclose a small pasture the previous June or July and allow no Texas cattle on it after that time. About December 1, burn off the grass. Very few ticks will survive such measures. Suitable sheds for shelter against storms should be provided. The cattle should be put in the above described enclosure immediately on their arrival, and allowed some time to recover from the effects of their journey; say ten or fifteen days, before being inoculated. They will require some time to adjust themselves to a new diet. It will be seen from the "College Station" experiment, page 44, that this may be done gradually without any marked digestive disturbance. With proper care they become accustomed in a few weeks to eating cotton seed hulls and a mixture of bran, oats and cotton seed meal. They should not have free access to cotton seed in large quantities, as this causes a very troublesome diarrhoea in some calves. In many parts of the state the cactus is abundant. This is a very suitable food for cattle during the inoculation fever, as it contains a mucilaginous substance which has a laxative effect. If this be not available, a few acres planted in oats furnishes an excellent winter pasture.

**Relapses.**—A few deaths occurred four or five months after the cattle were exposed to infected grounds. In the Green herd ten head died. Among the Tod bulls, two of the oldest animals died, and another of the large ones was sick. A few of the smaller ones were a little off. Both of the Waskom two-year-old bulls were sick, but recovered.

All of the bulls had ripened a few ticks without showing any fever. The Tod bulls had been well infested, but at the time of death were carrying only a few ticks. It appears that in the Green herd a number of the calves did not pick up many ticks until well along in the summer, when they became grossly infested. In this case, the long interval between inoculation and gross infestation may account for the result. An additional inoculation or several mild tick infestations earlier in the season might have given the necessary stimulation to effect immunity.

In this case it is not known whether the bulls that died had reacted well from the inoculation as indicated by records of this lot were not made.

**Effects on Reproduction.**—No evil effects of inoculation on the powers of reproduction have been observed in these experiments.

**BullOCK.**—The bulls have done good service.

**Rhes.**—"All the heifers," first inoculated, "produced good healthy calves the following spring and another lot appear to be pregnant five months after inoculation."

**Tod.**—"The bulls have done good service. I estimate that they have sired 290 calves."

**Waskom.**—"The bulls run daily with the cows and are doing service."

**College Station.**—"All the heifers appear to be pregnant."

**Kruger.**—"The oldest heifer produced a good calf 9 months after inoculation."

We have but little data as to the dangers of abortion following inoculation. Only one case has occurred in our experiments. This one in a Hereford heifer recently inoculated at the Missouri Experiment Station. On this point Dr. J. S. Hunt (Pathologist to the Department of Agriculture, Queensland, in Annual Report for 1897-'98, page 87), says: "The risk is greater in cows that are in calf; abortion is more frequent in cows than in heifers. Severe attacks of fever have been produced by the use of 1 cc. of blood from an animal grossly infested with ticks. As the susceptibility of animals varies greatly, it is prudent to give a small initial dose and repeat if necessary. In the Bul-

## PRESIDENT W. W. VAUGHN'S ADDRESS.

At the Annual Meeting of the Iowa Short-horn Breeders' Association.

The address of Mr. W. W. Vaughn, president of the Iowa Short-horn Breeders' Association, read at the annual meeting held at the College Chapel, at Ames, Dec. 14, 1899, is a valuable paper and will be read with deep interest by RURAL WORLD readers who are interested in cattle. President Vaughn said:

Gentlemen of the Short-horn Breeders' Association of the State of Iowa—As breeders of the most popular breed of cattle in this the greatest cattle growing state in the Union, we must acknowledge this closing year of the nineteenth century a most successful one.

The cereal crops on the average were abundant in quantity and good in quality. The freezing out of the clover plant last winter necessitated the breaking up of many meadows, and left others with a thin stand of grasses, thus reducing the quantity of hay, but under the favorable weather of the harvest season the crop was matured and gathered in prime condition. This supplemented by an abundance of rich and nutritious corn fodder and the long continued mildness of the autumn weather leaving all outside picking, such as aftermath, corn stalks and winter blue grass available, has removed all danger of a forage famine.

The extreme severity of the late winter and the cold and dampness of the backward spring, made it difficult to keep the herds comfortable, or properly care for the increase. The harshly during the summer months continues by his increasing numbers and persistence, to prove a formidable adversary. While calf cholera, chronic abortion, pink eye, tuberculosis and kindred evils, must occasionally be reckoned with as disturbing elements to our prosperity. We should be thankful that no serious or wide spread malady has attacked our herds and that the general health of the cattle stock of the state is good. The times for which during the past years of depression in the cattle industry the hopeful hope for and the desponding despair of have fully arrived; and leave little to be desired in the way of values for well bred cattle. The demands for the increase of our herds as well as the prices obtainable, which leave no serious profit above the cost of reproduction, are or should be thoroughly satisfactory to every breeder. The year throughout has been one of high prices for beef from well bred cattle well matured and we note with satisfaction that over seventy per cent of the high class beef is produced from animals carrying a greater or less amount of Shorthorn blood. Within our state during the past year we claim the distinction of having produced and sold more pure bred breeding animals of the Shorthorn breed and at better prices than any other state; of having sold and bought the highest priced male and female; of having made the highest average at a public sale; and of having furnished the largest number of pure bred bulls for use on the ranges. Through our enterprising and energetic middlemen as well as buyers who sell to ranchmen direct, we have the range trade well in hand. There will in time spring up a demand for pure-bred breeding stock from our newly acquired governmental possessions, and Iowa breeders should look well to it that we get our share of that trade.

Renewed interest is being taken in making exhibits at state and local fairs. We should feel proud of the number and quality of Shorthorns shown by Iowa breeders at our last state fair, and rejoice that most of the prizes in classes, as well as what should be the most coveted of all prizes, that for herd, especially when bred by an exhibitor, were captured by Iowa breeders; and we trust the high rank taken this year may be maintained in the state as well as the international shows projected next year.

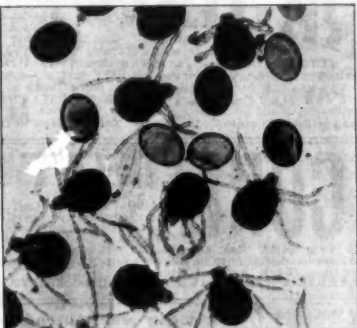
While we are proud of the achievements of the past, and satisfied with the conditions of the present, there are many hopeful signs of greater prosperity in the future. The almost wholesale abandonment of the use of the mixed breed and grade sire, by the average farmer, and the founding of pure bred herds by the more enterprising and intelligent, argues well not only for the future of the breeder's business, but for the rapid improvement in quality of the general cattle stock of the state as well. We all will welcome the speedy return of the conditions when Iowa feed lots can be filled with high grade feeders, bred and raised on Iowa soil, instead of having to bring them from the Western ranges.

There is, too, among breeders as well as those starting herds, an ever increasing tendency towards making quality, which should mean an inherited adaptability in type to the demand of the highest-priced beef market; the first consideration, and of making special lines of breeding, considered fashionable or fancy, the popularity or disrepute of remote ancestors; the color of the hair or style of horn, and such like personal fancies, are secondary or unimportant. The milking qualities of the breed are claiming increased attention and many breeders are commendably enthusiastic in developing their herds along those lines, for the dual purpose cow has been proven to be a practical possibility, and she usually is highly tintured with Shorthorn blood.

To the older breeders who have witnessed the ups and downs of many years and withstood the discouragements of the years of dullness and depression, we congratulate you on your zeal and fortitude and bid you now reap the full reward of pleasure and profit from your business. To the younger breeders and those starting herds, we bid you welcome, believing there is no business that offers better returns in glory and gold for time, money and labor, intelligently and industriously expended, than in breeding and raising pure bred Shorthorns in the state of Iowa.

## STOCK NOTES.

**FRED A. DALTON, Walker, Mo.** breeds Shorthorn cattle and Poland-China hogs and is building up fine herds of both. At the head of the Shorthorn herd is Adwain, 139.25, a fancy, deep red, low down beefy two-year-old, bred by Mr. H. A. Barber, of Windsor, Mo. Advance is by Duke and Chief Leaf, 134.25, and out of Julia K., by Duke of Sutherland, 23.00, tracing to Imported Belina, by Bampton (64). Mr. Dalton's fancy, deep red, low down King Hadley and other leading strains. Mr. Dalton bought at the Young's early sale two fine girls, one of Missouri's Black Chief, 13.00, and the other by Turner's Chief Tecumseh 2nd, 17.50. In a recent letter from Mr. Dalton, he writes as follows: "I have been a reader of the RURAL WORLD for nine years. For the last two seasons I have used it as an advertising medium, and it has given me splendid returns."



Young Fever Ticks, "Boophilus Bovis," and Eggs—Highly Magnified.

In cattle shipped from the north are rarely less than forty per cent and frequently seventy per cent, or more. The pressing need for some practical method of preventing these losses has led the Experiment Stations of Missouri and Texas and the Missouri State Board of Agriculture to undertake the experiments reported herein.

This co-operative work was begun in 1896, and is still in progress. The interests of the cattle industry demand that the results obtained up to the present time be presented in official form. There is probably much work yet to be done before the methods, which can now in careful hands be employed with a great degree of success, reach the perfection that is desirable.

The work reported herein includes:  
 I. Experiments to determine whether sterile blood serum of immune southern cattle contains any chemical substance of the nature of an antitoxin, or toxin that might be utilized practically in stimulating at least a passive immunity in susceptible cattle.

II. Experiments on immunizing cattle by infection with the micro-parasites of the disease by means of tick-infestation.

III. Experiments on immunizing cattle by infection with the micro-parasites of the disease through blood inoculation.

These will be discussed in the order named. Only a brief discussion of the first two lines of work will be given in this bulletin.

The final results of the experiments on inoculation with sterile serum show that such material possesses no protective properties.

Immunizing by tick infestation can be employed with success, but on account of the necessity of maintaining a quarantined pasture, and the necessity of hand-feeding in the case of calves of non-immune cows, this method is not as practicable as that of blood inoculation.

In the blood inoculation experiments, over four hundred head of thoroughbred cattle have been used. The losses from inoculation and from subsequent exposure to infected pastures in Texas, have been less than eight per cent.

The cause of "Texas fever," and the means by which it is transmitted, have been so fully presented in Experiment Station Bulletins, and in the agricultural press, that any extended treatment of these matters will be unnecessary for the purpose of this bulletin.

It will be sufficient to state that the cause of the fever is a minute parasite occurring in the blood of southern-raised cattle, but causing in these under ordinary circumstances no illness, these cattle being immune; but when transferred in any considerable numbers to the blood of northern-raised cattle give rise in the latter to a serious fever.

The natural way in which these micro-parasites are transmitted is by means of the southern-cattle-tick (Boophilus bovis). The disease can also be induced artificially in susceptible cattle by hypodermic injection of infected blood from southern cattle.

1. Experiments on Inoculation of Northern Cattle With Sterile Serum from Immune Southern Cattle.—These experiments were made to determine whether the serum of the blood of immune southern cattle contains any chemical substance, apart from the living organisms



Group of Inoculated Shorthorn Heifers, Raised in Cooper County, Mo., That Have Passed Two Seasons in Texas.

of young cattle and one cow were inoculated at Enterprise, Mississippi. These had all sickened from accidental tick-infestation. Twelve other cattle had died, all but two of them being adult animals. All the inoculated animals lived. A full report appears in Bulletin No. 37, of the Missouri Experiment Station, where the method of preparing the serum is described.

These experiments were not regarded as conclusive, since the season of the year at which the work was done, and the youthfulness of most of the animals inoculated, might account for the result. In order to give the matter a more decisive test a larger experiment was planned for the following summer, and carried out in conjunction with the Mississippi Experiment Station in June and July, 1897. A full report of the results upon the cattle shipped to the Mississippi Station appears in Bulletin No. 42, of that station. Only a summary is given here.

Eleven head were inoculated, eight of these at the Missouri Station before shipping, and three after their arrival in Mississippi. These cattle varied in age from one and one-half years to eleven years. They were inoculated daily with

ing summer, the same difference was noted between young and old cattle in resisting the disease.

These observations led to the experiments to test the practicability of immunizing cattle on northern stock farms by tick infestation. This work was begun in 1897, and has been continued to the present.

(Here follows a detailed history of the experiments carried on.)

III. Experiments on Immunizing Northern Cattle Against Texas Fever by Inoculation With Infected Blood.—In the following section a report is given of the inoculation of over four hundred registered breeding cattle raised north of the Texas fever quarantine line, and shipped into infected territory in the State of Texas.

As stated in the introductory section Texas fever can be induced artificially in northern raised cattle by hypodermic injection of blood from immune southern cattle. This discovery was made by Drs. Smith and Kilbourne, in their classical investigations into the pathology of Texas fever. In the course of these investigations it was observed that the attack induced in this artificial way "was not so















2'S 

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ed, large and growthy and mellow as an app  
o Look Me Over sow, they make a great  
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